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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,218	08/22/2003	Manfred Engelhardt	GR 98 P 2661 D	1417

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EXAMINER

NGUYEN, DILINH P

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/646,218

Applicant(s)

ENGELHARDT, MANFRED

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 5 is objected to because of the following informalities:

Amended claim 5 is dependent on claim 3. Claim 3 comprises the step of forming an electrically conductive first diffusion barrier structure. Therefore, in lines 8-9 of claim 5, replace "Ta, TaN, Ti, and TiN" with "Ta and Ti" because TaN or TiN is not an electrically conductive material.

In line 7 of claim 5, replace "the second diffusion barrier structure" with "a second diffusion barrier structure--".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Chiang et al. (U.S. Pat. 5,739,579).

- Regarding claim 1, Chiang et al. (fig. 21 and 25) disclose a method of producing an integrated circuit configuration, which comprises:

forming a diffusion barrier layer 390 on a substrate 320 having at least a first insulating layer 350 with a first conductive structure 361 embedded therein (fig. 25), the diffusion barrier layer covering the conductive structure completely (fig. 21);

forming a second insulating layer 391 on the diffusion barrier layer 390 (fig. 25);
etching a contact hole into the second insulating layer 391 above the first
conductive structure; a surface of the first conductive structure 361 being covered with
the diffusion barrier layer 390 within the hole (fig. 25); wherein the step of etching the
contact hole into the insulating layer above the conductive structure 342 without
uncovering the conductive structure (fig. 21);

forming spacers (vertical portions of layer 393) on side walls of the contact hole,
the spacers acting as a barrier to diffusion of a material from the first conductive
structure 61 into the second insulating layer;

opening the contact hole as far as the surface of the first conductive structure;
and

forming in the contact hole a second conductive structure 394 conductively
connected to the first conductive structure (figs. 21 and 25, column 20, lines 35 et seq.).

- Regarding claim 3, Chiang et al. disclose forming the first electrically conductive
structure 361 (Cu) by applying the first insulating layer 350 to the substrate 320
(fig. 24);

producing an opening 351 with a bottom and side walls in the first insulating layer
350 (fig. 21);

depositing and structuring a first conductive barrier layer for forming an
electrically conductive first diffusion barrier structure 360 covering the bottom and
the side walls of the openings (fig. 24, column 19, lines 4-9); and

forming the first conductive structure by filling the opening with conductive material 361 (fig. 24).

- Regarding claim 5, Chiang et al. disclose forming one of the first conductive structure 361 and the second conductive structure 394 with a material selected from the group consisting of copper, silver or gold (fig. 25, column 19, lines 15-17);

forming the first diffusion barrier structure 360 with a material selected from the group of Ta (fig. 25, column 19, lines 6-10); forming one of the diffusion barrier layer 390 and the spacers 393 with a material selected from the group consisting of SiN (fig. 25, column 21, line 1).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. (U.S. Pat. 5,739,579) in view of Ting et al. (U.S. Pat. 5,969,422).

Chiang et al. substantially discloses all the limitations as claimed above except for the step of forming the spacers of electrically conductive material.

However, Ting et al. disclose that spacers 22 can be made of electrically conductive material (fig. 2, column 9, line 24). Therefore, it would have been obvious to one having ordinary skill in the art to form the spacer of Chiang et al. with the material as set forth above

because as taught by Ting et al., such conductive material would function as a barrier layer and an adhesion layer which provide the known purpose of preventing diffusion of Cu ions (column 9, lines 5-26).

Allowable Subject Matter

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection. Please see the new grounds of rejection above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

LONG PHAM
PRIMARY EXAMINER